

IN THE CLAIMS

1. A pin valve assembly comprising:
 - a pin block housing a valve pin;
 - 5 a fluid plate with a fluid channel for fluidically communicating with the valve pin; and
 - a fitting block housing a fitting for fluidic communication with the fluid plate and for fluidic communication with fluidic components.
- 10 2. A pin valve assembly as in claim 1 further comprising:
 - a fitting port, aligned with the fitting, and a pin valve seat, aligned with the valve pin.
3. A pin valve assembly as in claim 2 wherein:
 - 15 the fitting port is integrated into the fluid channel of the fluid plate.
4. A pin valve assembly as in claim 2 wherein:
 - the pin valve seat is integrated into the fluid channel of the fluid plate.
- 20 5. A pin valve assembly as in claim 2 wherein:
 - the fitting port is integrated into the fitting.
6. A pin valve assembly as in claim 2 wherein:
 - the pin valve seat is integrated into the pin valve.
- 25 7. A pin valve assembly as in claim 1 wherein:
 - the fitting block is coupled to the pin block with the fluid plate positioned between the pin block and fitting block.
- 30 8. A pin valve assembly as in claim 7 wherein:
 - the fitting block is coupled to the pin block by a screw connection.
9. A valve pin assembly as in claim 1 wherein:

the pin valve comprises a pin with distal and proximal ends substantially axially disposed in a housing.

10. A pin valve assembly as in claim 9 wherein
5 the distal end of the pin has a diamond-like carbon coating.

11. A pin valve assembly as in claim 1 wherein:
the valve pins are actuated by an actuator to provide for a distal end of the pin valve to sit in a pin valve seat substantially sealing the fluid channel and removing the
10 distal end of the pin valve from the pin valve seat opening the fluid channel.

12. A pin valve assembly as in claim 1 wherein:
the pin block houses six pin valves substantially equidistant from each other around the outside circumference of the pin block aligned with six pin valve seats on
15 the fluid plate.

13. A pin valve assembly as in claim 1 wherein:
the pin valve comprises a ring seal above the distal end of the pin and within a
20 pin housing for providing sealing of the fluid plate.

14. A pin valve assembly as in claim 1 wherein:
the fluidic components are an HPLC system pump syringe, pump, column, sample loop and sample syringe.

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15. A pin valve assembly as in claim 1 wherein:
each valve pin is housed in a housing comprising an actuator for axially moving the valve pin to sit on the pin valve seat and substantially block fluid flow from a downstream location or remove the pin from the pin valve seat and provide for
30 fluid flow to the down stream location.

16. A pin valve assembly as in claim 1 wherein:

the pin valve comprises pin seals, a seal load sleeve, a Belleville spring, and a nut seal around a distal end of a pin below a load ring, and a second Belleville spring and a nut above the load ring.

5 17. A pin valve assembly as in claim 16 wherein:

the pin seals are two polyetheretherketone washers surrounding a polytetrafluoroethylene washer.

18. A pin valve assembly comprising:

10 a pin block for housing pin valves;

a fluid plate with a fluid channel for fluidically communicating with the pin valves; and

a fitting block for housing fittings for fluidic communication with the fluid plate and for fluidic communication with fluidic components.

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19. A pin valve assembly as in claim 18 further comprising:

pin valves housed within the pin block; and

fittings housed within the fitting block.

20 20. A pin valve assembly as in claim 19 further comprising:

one or more fitting ports, aligned with the fittings, and one or more pin valve seats, aligned with the pin valves.

21. A pin valve assembly as in claim 20 wherein:

25 the fitting ports are integrated into the fluid channel of the fluid plate.

22. A pin valve assembly as in claim 20 wherein:

the pin valve seats are integrated into the fluid channel of the fluid plate.

30 23. A pin valve assembly as in claim 20 wherein:

the fitting ports are integrated into the fittings.

24. A pin valve assembly as in claim 20 wherein:

the pin valve seats are integrated into the pin valves.

25. A pin valve assembly as in claim 18 wherein:

valve pins impinge on the pin valve seat with which it aligns and substantially block the flow of fluid through the fluid channel of the fluid plate.

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26. A pin valve assembly as in claim 25 wherein:

each pin valve is housed in a standardized housing comprising a means for actuation for axially moving the pin valve to sit on the pin valve seat and substantially block fluid flow from a downstream location or remove the pin from the pin valve seat and provide for fluid flow to the down stream location.

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27. A pin valve assembly as in claim 26 wherein:

the valve pin housing is releasably fitted to the pin block.

15 28. A pin valve assembly as in claim 18 wherein:

the fluid plate is stainless steel coated with a fluorocarbon polymer.

29. A pin valve assembly as in claim 28 wherein:

the fluorocarbon polymer is tetrafluoroethylene.

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30. A pin valve assembly as in claim 18 wherein:

the fluid plate is stainless steel with a substantially flat fluorocarbon polymer shim on its surface that is sealed against pin block and fitting block.

25 31. A pin valve assembly as in claim 30 wherein:

the fluorocarbon polymer is tetrafluoroethylene.

32. A pin valve assembly as in claim 18 wherein:

the fitting block is coupled to the pin block with the fluid plate positioned between the pin block and fitting block.

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33. A pin valve assembly as in claim 18 wherein:

the pin valve comprises a pin with distal and proximal ends substantially axially disposed in a housing.

34. A pin valve assembly as in claim 33 wherein:

the pin valves are actuated by an actuator to provide for the distal end of the valve pin to sit in the pin valve seat substantially sealing the fluid channel and removing the distal end of the valve pin from the pin valve seat opening the fluid channel.

35. A pin valve assembly as in claim 34 wherein:

the actuator is pneumatically operated.

36. A pin valve assembly as in claim 18 wherein:

the fluidic components are an HPLC system pump syringe, pump, column, sample loop and sample syringe.

37. A pin valve assembly as in claim 18 wherein:

each valve pin is housed in a standardized housing comprising a means for actuation for axially moving the valve pin to sit on the pin valve seat and substantially block fluid flow from a downstream location or remove the pin from the pin valve seat and provide for fluid flow to the down stream location.

38. A pin valve assembly comprising:

a pin block housing pin valves with pin valve seats;

a fluid plate with one or more channels having channel ends; and

a fitting block housing fittings for fluidic communication with fitting ports in

fluidic communication with the pin valve seats and for fluidic communication with fluidic components.

39. A pin valve assembly as in claim 38 wherein:

the fitting ports are integrated into the fluid plate.

40. A pin valve assembly as in claim 38 wherein:

the fitting ports are integrated into the fittings.

41. A pin valve assembly as in claim 38 wherein:
the valve pins are aligned with the channels of the fluid plate.
42. A pin valve assembly as in claim 38 wherein:
5 the channels of the fluid plate comprise six channels with ends.
43. A pin valve assembly as in claim 38 wherein:
the pin valves each align with two channel ends of the fluid plate.
- 10 44. A pin valve assembly as in claim 42 wherein:
the pin valve seats comprise a first passage for fluidic communication with
a channel end and a second passage for fluidic communication with another channel
end.
- 15 45. A pin valve assembly as in claim 38 wherein:
the pin valves comprise a pin for substantially blocking fluidic
communication between the first and second passage of the pin valve seat.
46. A pin valve assembly as in claim 44 wherein:
20 the pin is actuated to block the first and second passage of the pin valve seat
by an actuator.
47. A pin valve assembly as in claim 45 wherein:
the actuator is actuated pneumatically.
- 25 48. A pin valve assembly as in claim 46 wherein:
the pin valve comprises a pin for substantially blocking fluidic
communication between the pin valve seat and the fluid plate.
- 30 49. A pin valve assembly as in claim 38 wherein:
each valve pin is housed in a standardized housing releasably fitted to the pin
block.

50. A pin valve assembly as in claim 38 wherein:
the fluid plate is stainless steel coated with a fluorocarbon polymer.
51. A pin valve assembly as in claim 38 wherein:
5 the fluorocarbon polymer is tetrafluoroethylene.
52. A pin valve assembly as in claim 50 wherein:
the fluid plate is stainless steel with a substantially flat fluorocarbon
polymer shim on its surface that is impinged by the pin block and fitting block.
- 10 53. A pin valve assembly as in claim 38 wherein:
the fluorocarbon polymer is tetrafluoroethylene.
54. A pin valve assembly as in claim 52 wherein:
15 the fitting block is coupled to the pin block with the fluid plate positioned
between the pin block and fitting block.
55. A pin valve assembly as in claim 38 wherein:
the pin valves are actuated by an actuator to provide for a distal end of the
20 valve pin to sit in the pin valve seat and removing the distal end of the valve pin from
the pin valve seat.
56. A pin valve assembly as in claim 55 wherein:
the actuator is pneumatically operated.
- 25 57. A pin valve assembly as in claim 38 wherein:
the fluidic components are an HPLC system pump syringe, pump, column,
sample loop and sample syringe.
- 30 58. A method of controlling the flow of a fluid comprising:
providing a fluid plate with a connected fluid channel, intersecting pin valve
seats, and fluidic fitting ports;
supplying fluid to the fluid channel from a fluidic component in
communication with the fluidic fitting ports;

moving the fluid by use of the fluidic components; and
sealing the fluid channel at selected pin valve seats by impinging on the seats
with corresponding valve pins.

5 59. A method of controlling the flow of a fluid as in claim 58 wherein:

the fluidic components are an HPLC system pump syringe, pump, column,
sample loop and sample syringe.

60. A method of controlling the flow of a fluid as in claim 59 wherein:

10 during a load stage the fluid channel is open for fluidic communication from
the sample syringe through the sample loop and from the sample loop through the
system syringe and sealed from fluidic communication from the sample loop to the
pump, from the sample loop to the column and from the sample syringe to the pump
syringe; and,

15 during an inject stage the fluid channel is open for fluidic communication from
the pump through the sample loop and from the sample loop through the column and
sealed from fluidic communication from the pump through the column and from the
sample syringe through the sample loop and from the sample loop through the pump
syringe.

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61. A method of controlling the flow of a fluid as in claim 59 wherein:

during a load stage the pin valves provide for a fluid sample to be transferred
from the sample syringe and loaded into the sample loop by a pressure difference
created by the pump syringe and during an inject stage the pin valves provide for the
25 sample to be injected from the sample loop into the column by a pressure difference
created by the pump.